ABSTRACT

Methods of coating a semiconductor device with phosphor particles are disclosed. In the methods, a bath is provided which contains suspended particles of a first phosphor material and suspended particles of a second phosphor material. The particles of the first phosphor material have a mean particle size in the range from about 1 micron to about 6 microns, and the particles of the second phosphor material have a mean particle size in the range from about 12 microns to about 25 microns, wherein the particle size distribution of the phosphor material in the bath is bimodal. The semiconductor device is disposed in the bath containing the suspended particles, and a first biasing voltage is applied between an anode in electrical contact with the bath and the p side to hold the anode at a positive voltage with respect to the p side. A second biasing voltage is applied between the p side and the n side. In particular embodiments, the method results in a substantially conformal coating of the phosphor particles being deposited on at least one surface of the semiconductor structure.